19 ~~14~~. (Once Amended) A total-reflection x-ray fluorescence apparatus comprising:

an x-ray source for providing x-rays;

a doubly-curved x-ray optic for diffracting and focusing the x-rays provided by the x-ray source;

a surface onto which at least some of the diffracted and focused x-rays are directed;

an x-ray detector for detecting resulting x-ray fluorescence emitted by any foreign matter present on the surface; and

wherein the locations of the doubly-curved x-ray optic, x-ray source, and point of impingement upon the surface define an optical circle of radius R wherein the doubly-curved x-ray optic has an optic surface of radius 2R and one or more atomic planes essentially parallel with the optic surface.

35 ~~22~~. (Once Amended) A method as recited in claim ~~18~~ 33, further comprising passing the diffracted x-rays through at least one aperture to limit the convergent angle onto the surface of the diffracted x-rays, wherein the convergent angle comprises the angle subtending the upper and lower extents of the diffracted x-rays.

24 ~~11~~. (Twice Amended) A total-reflection x-ray fluorescence apparatus comprising:

an x-ray source for providing x-rays;

a doubly-curved x-ray optic for diffracting and focusing the x-rays provided by the x-ray source;

a surface onto which at least some of the diffracted and focused x-rays are directed;

an x-ray detector for detecting resulting x-ray fluorescence emitted by any foreign matter present on the surface; and

wherein the x-ray source and the point of impingement upon the surface define an optic circle of radius R, and wherein the doubly-curved x-ray optic comprises a surface and a plurality of atomic planes of radius RP which intersect the surface at an angle α;

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and wherein the radius of the atomic planes RP of the doubly-curved x-ray optic is defined by the equation RP = 2R cos α.

Kindly add the following new claims 51 – 64:

13 ~~51~~. (New) The apparatus as recited in claim 1, wherein the doubly-curved x-ray optic comprises:

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a backing plate having a supporting surface;

an adhesive layer disposed above said supporting surface of said backing plate, said adhesive layer having a minimum thickness x; and

an optical layer disposed above said adhesive layer, said optical layer comprising an optical surface, said optical surface of said optical layer having a desired curvature, and said optical layer having a thickness y, wherein x>y.

14 ~~52~~. (New) The apparatus as recited in claim 13 ~~51~~, wherein said supporting surface of said backing plate has a curvature, said curvature of said supporting surface being different than said curvature of said optical surface of said optical layer.

15 ~~53~~. (New) The apparatus as recited in claim 13 ~~51~~, wherein said adhesive comprises an epoxy material, and wherein said optically curved element further comprises a protective layer surrounding an edge of said optical layer such that said adhesive is disposed between said optical layer, with said protective layer surrounding said edge thereof, and said supporting surface of said backing plate.

16 ~~54~~. (New) The apparatus as recited in claim 13 ~~51~~, wherein said minimum thickness x of said adhesive layer is greater than or equal to 20 μm; and said thickness y of said flexible layer is greater than or equal to 5 μm.

17 ~~55~~. (New) The apparatus as recited in claim 13 ~~51~~, wherein said optical layer comprises a crystal.

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18 ~~56~~. (New) The apparatus as recited in claim ~~55~~, wherein said adhesive layer is an epoxy, and wherein: x is between 0.1 mm and 1 mm and y is between 10 μm and 50 μm.

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23 ~~57~~. (New) The apparatus as recited in claim ~~14~~, wherein the doubly-curved x-ray optic comprises:

a backing plate having a supporting surface;

an adhesive layer disposed above said supporting surface of said backing plate, said adhesive layer having a minimum thickness x; and

an optical layer disposed above said adhesive layer, said optical layer comprising an optical surface, said optical surface of said optical layer having a desired curvature, and said optical layer having a thickness y, wherein x>y.

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38 ~~58~~. (New) The method as recited in claim ~~18~~, wherein the doubly-curved x-ray optic comprises:

a backing plate having a supporting surface;

an adhesive layer disposed above said supporting surface of said backing plate, said adhesive layer having a minimum thickness x; and

an optical layer disposed above said adhesive layer, said optical layer comprising an optical surface, said optical surface of said optical layer having a desired curvature, and said optical layer having a thickness y, wherein x>y.

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39 ~~59~~. (New) The method as recited in claim ~~58~~, wherein said supporting surface of said backing plate has a curvature, said curvature of said supporting surface being different than said curvature of said optical surface of said optical layer.

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40 ~~60~~. (New) The method as recited in claim ~~58~~, wherein said adhesive comprises an epoxy material, and wherein said optically curved element further comprises a protective layer surrounding an edge of said optical layer such that said adhesive is disposed between said optical layer, with said protective layer surrounding said edge thereof, and said supporting surface of said backing plate.

41 ~~61~~. (New) The method as recited in claim 38 ~~58~~, wherein said minimum thickness x of said adhesive layer is greater than or equal to 20 μm; and said thickness y of said flexible layer is greater than or equal to 5 μm.

42 ~~62~~. (New) The method as recited in claim 38 ~~58~~, wherein said optical layer comprises a crystal.

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43 ~~63~~. (New) The method as recited in claim 42 ~~62~~, wherein said adhesive layer is an epoxy, and wherein: x is between 0.1 mm and 1 mm and y is between 10 μm and 50 μm.

32 ~~64~~. (New) The apparatus as recited in claim 24 ~~41~~, wherein the doubly-curved x-ray optic comprises:

a backing plate having a supporting surface;

an adhesive layer disposed above said supporting surface of said backing plate, said adhesive layer having a minimum thickness x; and

an optical layer disposed above said adhesive layer, said optical layer comprising an optical surface, said optical surface of said optical layer having a desired curvature, and said optical layer having a thickness y, wherein x>y.